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Vol. 25 April, 1952 Number 2

A REVISION OF THE GENUS MEGAMELANUS AND ITS ALLIES (HOMOPTERA, FULGORIDAE, DELPHACINAE)[1]

BERNARD T. MCDERMOTT[2]

INTRODUCTION

The present paper consists of a revision of a rather hetergeneous group of species of delphacine fulgorids usually placed in the genus *Megamelanus* Ball. In 1902 Ball erected the genus *Megamelanus* with *bicolor* as the genotype. The following species have been added since: *elongatus* Ball (1905), *rufivittatus* Ball (1905), *spartini* Osborn (1905), *frontalis* Crawford (1914), *dorsalis* Metcalf (1923), *terminalis* Metcalf (1923), *lautus* Metcalf (1923), all North American species, and *graminicola* Muir (1928) from Bermuda. This study was confined to those species occurring in the United States.

The types of *M. spartinii* Osborn have been lost and, therefore, are not illustrated in the present work. However, on the basis of the original description it is provisionally placed in the genus *Neomegamelanus* n. gen.

KEY TO GENERA

1. Head acutely pointed in dorsal view; pronotum flared at lower margin ..... *Neomegamelanus*
   Head not acutely pointed in dorsal view; pronotum normal 2
2. Head swollen in appearance; lateral carinae of head not strongly elevated ..... *Tumidagena*
   Head not acutely pointed or swollen in appearance. Pentagonal or truncate in dorsal view 3
3. Clypeus[1] about one and one-half times as long as wide near apex, widest at middle; pygofer of males deeply notched at about level of genital styles; brachypterous forms with elytra extending to about third abdominal segment ..... *Megamelanus*
   Clypeus about two times as long as wide near apex, widest near apex; pygofer of males regular, not conspicious by indentation of hind margin; elytra of brachypterous forms extending almost to or beyond end of abdomen. ..... *Prokelisoidea*

[1]The front of the head, sometimes termed the front or frons

Megamelanus Ball

Megamelanus Ball, 1902, Can. Ent., *34*:265.

"Resembling *Megamelus*, but with the front of equal width above and below and the vertex sharply angled in front. Resembling *Delphacinus*, but

[1]Contribution No. 772 from the Department of Entomology, University of Kansas.
[2]Now at the Rocky Mountain Laboratory (Public Health Service), Hamilton, Montana.

with the side keels of the pronotum attaining the hind margin. Vertex 5-angular, but with the lateral foveae depressed and their inner carinae strong and meeting at the sharp apex, giving it the appearance of being acutely triangular; front broad, nearly rectangular, median carina distinct, not forked, a trifle the widest in the middle, the lateral margins gently evenly curving, the apical margin carinate just above the deep clypeal suture; clypeus small, rounding, without carinae; pronotum shorter than vertex, strongly tricarinate, the lateral pair just inside and parallel with those on vertex, extending to the posterior margin; elytra commonly brachypterous, covering the second abdominal segment. In the macropterous form long and broadly rounding posteriorly; venation nearly as in *Megamelus*.

"Type of genus *Megamelanus bicolor*."

Type in Ball collection in U.S.N.M.

Megamelanus bicolor Ball

Pl. 1

Megamelanus bicolor Ball, 1902, Can. Ent., *34*:265-266.

Superficially resembling *Tumidagena terminalis* (Metcalf) but head in dorsal view pentagonal in shape. Elytra of brachypterous form extending to about third abdominal segment. Length ♂ 1.5 - 1.8; ♀ 2.5.

Genitalia: In lateral view pygofer with deep notch in hind margin about level of styles; ædeagus a simple blade-like shaft, turned sharply downward between styles, sides closely compressed, caudal margins serrate, widest at base; gradually tapering to a point, a spine-like projection on ventral margin at base. Genital styles short, stout spines on outer margin extending for about half length of style; genital segment with lower margin curving sharply upward at the middle and then posteriorly to the hind margin giving it the shape of a rectangle with the lower hind corner removed, upper hind corner terminating in a pair of short processes; a small protuberance extends from lower margin of pygofer below styles, apex of protuberance spiculate.

Lectotype here designated, Ft. Collins, Colorado, July 28, 1898, (no collector label on pin). In U.S.N.M.

Additional material studied: Kansas: Meade, Reno, Seward, Wichita Counties; Arizona; St. Johns, Chino Valley; California: Little Lake, Palm City, Del Mar, Olancha, Campo, Potrero; Colorado: Ft. Collins; Idaho: Nampa, Burley; Nevada: Winnemucca, Elko, Fernley; New Mexico: Mesilla, Belen, Wagonmound, Socorro Co.; Utah: Vernal. All collected by R. H. Beamer. New Mexico: Belen, L. D. Beamer, California: Pine Valley, E. L. Todd.

Tumidagena n. gen.

Small insects from 2 to 4 mm. long, formerly included in the genus *Megamelanus* Ball. Lateral carinae of genae originating at base of lateral carinae of head above eye, extending forward laterad and ventrad, gradually returning mesad and upward to apex of head, imparting to head a distinctly swollen appearance. Vertex flat; lateral carinae not strongly elevated, meeting at apex of head; median carina clearly "Y" shaped, projecting forward to about front margin of eye; arms of stem diverging obliquely forward to lateral

carinae of head. Front margin of pronotum extended into hind margin of head to about middle of eye; pronotum equal to width of head, caudal margin slightly sinuate, concave, forming a shallow inverted "V" in outline; tricarinate, lateral carinae straight basally, diverging and fading out apically just before hind margin of pronotum, median carina extending length of pronotum. Calcar about two-thirds as long as first tarsal segment including apical spines, strongly and uniformly toothed. Anal segment with a pair of processes. First antennal segment as long as wide, second segment three times as long as first.

Type species: *Tumidagena minuta* n. sp.

Key to the Species of the Genus *Tumidagena*

1. Head length less than twice width at base ..... *T. minuta*
   Head length at least twice width at base 2
2. Head almost three times as long as width at base; aedeagus with a large fang-like spine at base on right side ..... *T. terminalis*
   Head slightly more than twice as long as width at base; aedeagus without a large fang-like spine at base on right side ..... *T. propinqua*

Tumidagena terminalis (Metcalf)

Pl. 2

Megamelanus terminalis Metcalf, 1923, Jour. Elisha Mitch. Sci. Soc., *38*:198-199.

T. terminalis resembling *T. propinqua* n. sp. but with a large spine on the right side at base of aedeagus. Resembling *T. minuta* n. sp. but with vertex almost three times as long as width at base. Length ♂ 2.5 - 3 mm.; ♀ 3 - 3.75 mm.

Genitalia: Similar to *T. minuta* but slightly larger. In lateral view pygofer of male irregular in shape, margins regular (see plate 2); in caudal view genital styles long, about five times as long as width at base, apices acuminate on inner margin, curved in on outer fourth; anal segment with a pair of stout, tusk-like processes about as long as dorsal margin of anal segment, slightly curved; in ventral view aedeagus resembling a boot, wider at base and tapering to a more or less pediform apex, sides sinuous with serrate margins, a large fang-like spine at base on right side.

Additional material studied: 24 ♂ ♂ and 31 ♀ ♀, Cedar Keys, Florida, March 8, 1947; 13 ♂ ♂ and 6 ♀ ♀, Yankee Town Florida, March 9, 1947; 1 ♀, Brownsville, Texas, December 27, 1945; 14 ♂ ♂ 10 ♀ ♀, Palatka, Fla., December 24, 1950. All collected by R. H. Beamer. 4 ♂ ♂, Palatka, Fla., December 25, 1950, L. D. Beamer.

Macropterous form: Like the brachypterous form with fully developed flight wings: wings about four times as long as broad at widest point, extending beyond end of abdomen for about one-fifth their length, slightly widening toward apex, widest about one-fifth from apex, broadly rounded, hyaline; veins whitish with a series of slender black hairs evenly spaced along them; length of female 3.5 mm.

Types: Holomorphotype ♀, Cedar Keys, Florida, March 8, 1947, L. D. Beamer; paramorphotype ♀, Cedar Keys, Florida, March 8, 1947, R. H. Beamer. Types in Snow Entomological Collections.

Tumidagena minuta n. sp.
Pl. 2

Brachypterous form: Resembling *T. terminalis* (Metcalf) but with crown less than twice as long as width at base. Length of ♂ 2 mm.; ♀ 3 mm.

Structure: Head projecting about half its length in front of eyes: elytra reaching to about third abdominal segment, about twice as long as wide, apices broadly rounded, venation simple, veins setiferous with short black hairs easily rubbed off resulting in most specimens having veins bare; flight wings aborted; clypeus rectangular, margins subparallel slightly tapering toward base, slightly more than twice as long as wide at middle.

Color: General body color uniformly pale ivory with a waxy luster, especially evident on dorsal surface or abdomen; pygofer fulvous with caudal margin darker; the front and middle parts of legs smoky, hind legs whitish with spines on tibia, calcar, tarsi and tarsal claws conspicuous by their blackness; basal two-thirds of wings semihyaline allowing pruinose surface of mesonotum to show through; apical third of wing opaque with surface glossy.

Genitalia: In lateral view pygofer of male irregular in shape (see plate 2); in caudal view genital styles, about five times as long as wide at base, curving in on outer fourth, apices acuminate on inner margin; anal segment with a pair of stout, tusk-like processes, about equal to dorsal margin of anal segment in length, curved. In ventral view aedeagus resembling a boot, wider at base and tapering to more or less pediform apex, sides sinuate with serrate margins, a large fang-like spine at base on right side.

Females similar to males but with color of body uniformly ochraceous with a waxy luster; spines on tibia, calcar, tarsi tipped with black, tarsal claws black.

Types: Holotype ♂, Allotype ♀, 38 ♂ and 70 ♀ paratypes, Mystic, Connecticut, August 8, 1946, R. H. Beamer; other paratypes: 10 ♂ ♂ and 22 ♀ ♀, Montauk, Long Island, New York, August 17, 1946, R. H. Beamer; 4 ♂ ♂ and 4 ♀ ♀, Piney Point, Maryland, August 26, 1946, R. H. Beamer. Types in Snow Entomological Collections.

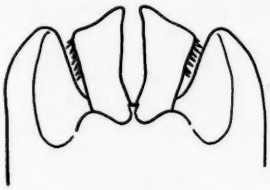
Tumidagena propinqua n. sp.
Pl. 1

Brachypterous form: Resembling *T. terminalis* (Metcalf) but lacking large fang-like spine at base of aedeagus and with a shorter crown which is from two to two and one-half times as long as width at base. ♂ 2.5 mm.; ♀ 3.25 mm.

Structure: Head projecting about half its length in front of eyes: elytra reaching to about third abdominal segment, about twice as long as wide, apices broadly rounded, venation simple, veins setiferous, but setae easily rubbed off resulting in most specimens having veins bare; flight wings aborted; clypeus rectangular, margins subparallel slightly tapering toward base, more than three times as long as wide at middle.

Color: General body color stramineous with a waxy luster becoming yellowish-orange in summer forms and ochraceous to fulvous in spring forms; legs orange-yellow with spines on tibia, calcar, tarsi and tarsal claws black; base of wings semihyaline allowing pruinose surface of mesonotum to

PLATE I



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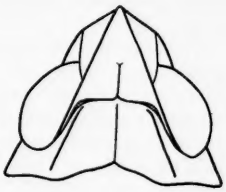

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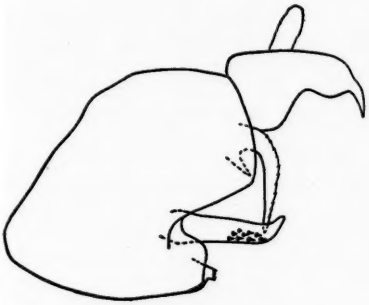
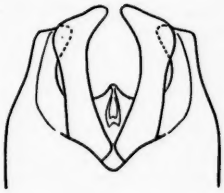


1. M. bicolor (Ball)



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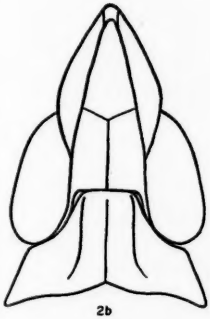

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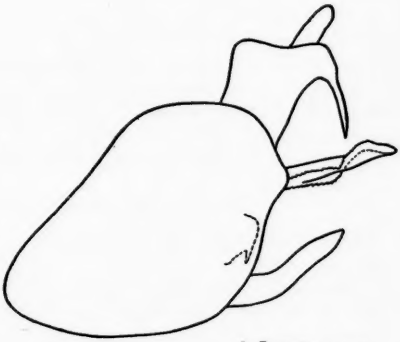


2. T. propinqua n. sp

EXPLANATION OF PLATE 1

Fig. 1 *Megamelanus bicolor*, lateral view of pygofer and anal segment.
Fig. 1a *Megamelanus bicolor*, ventral view of pygofer showing genital plates.
Fig. 1b *Megamelanus bicolor*, dorsal view of head and pronotum.
Fig. 2 *Tumidagena propinqua*, n. sp., lateral view of pygofer and anal segment.
Fig. 2a *Tumidagena propinqua*, ventral view of pygofer showing genital plates.
Fig. 2b *Tumidagena propinqua*, dorsal view of head and pronotum.

show through; apical half piceous, opaque, entire surface of wing with a high gloss.

Genitalia: In lateral view pygofer of male irregular in shape, margins regular, caudal margin projecting slightly lobe-like at about level of aedeagus; aedeagus trough-like, straight, with sides at basal half refolded laterally so that serrate margin is ventrad, apical third with left side folded over dorsal apex of aedeagus imparting a pediform shape to it when seen from below, the apical third of right side with serrate margin dorsal; in caudal view styles about five times as long as wide at base, curving in on outer fifth, acuminate on inner margin; anal segment with a pair of slender thorn-like processes about as long as dorsal margin of anal segment, slightly curved.

Females similar to males but body uniformly fulvous with a waxy luster; spines on tibia, calcar, tarsi tipped with black; tarsal claws black.

Types: Holotype ♂, allotype ♀, 39 ♂ and 29 ♀ paratypes, Slidell, La,. Dec. 31, 1950, 2 ♂ and 5 ♀ ♀, Slidell, La., March 3, 1947; other paratypes: 3 ♂ ♂, and 1 ♀, Creole, La., June 17, 1948 4 ♂ ♂ and 1 ♀, Pearlington, Miss., June 25, 1948. Collected by R. H. Beamer, 12 ♂ ♂ and 2 ♀ ♀, Slidell, La., Dec. 31, 1950, L. D. Beamer. Types in Snow Entomological Collections.

Neomegamelanus n. gen.

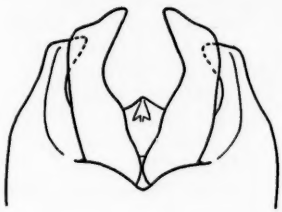
Elongate slender insects formerly included in the genus *Megamelanus* Ball. In dorsal view head long and acutely pointed, crown projecting in front of eye for about half its length or more; median carina usually evident basally becoming obsolete about middle of crown, lateral carinae strongly elevated, meeting at apex of head; lateral margins of clypeus visible for more than half its length, the basal part being hidden by the eye. Pronotum equal to width of head, extending into hind margin of head to a depth of two-fifth the long diameter of an eye; flared at lower margins; tricarinate, lateral carinae straight, diverging slightly to hind margin of pronotum; pronotum about half length of crown. Clypeus lanceolate, wide apically tapering to narrowed vertex, about twice as long as wide near apex, median carina single, strongly produced on upper third and becoming obsolete on basal half; calcar about three-fourths as long as first tarsal segment, strongly and uniformly toothed; first segment of antenna as wide as long; elytra of brachypterous forms long, extending almost to or beyond apex of abdomen; genital segment with one or more pairs of processes.

Type species: *Neomegamelanus lautus* (Metcalf)

Key to the Species of *Neomegamelanus*

1. Genital styles widening at apices; elytra without whitish triangles near apices 2
   Genital styles acuminate at apices; elytra with opposing triangles at apices, one on the inner margin, the other on the front margin 3
2. In caudal view anal segment with two pairs of processes, a short straight, spine-like upper pair, and below these a much longer slender curved pair. Hind legs black and white ..... *N. dorsalis*

PLATE 2



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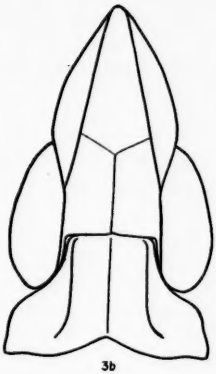

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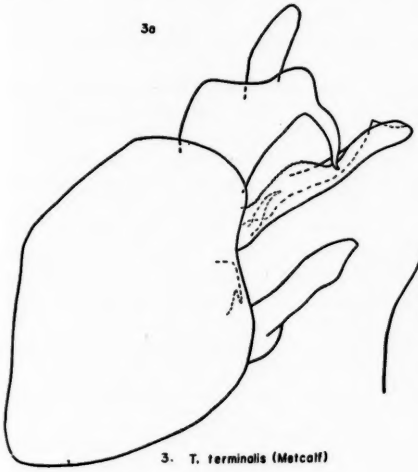
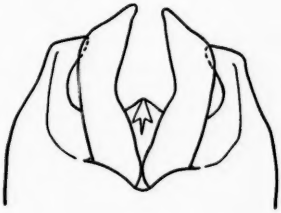


3. T. terminalis (Metcalf)



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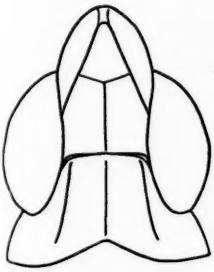

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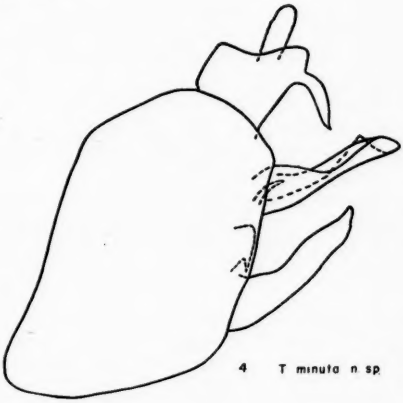


4 T minuta n sp

In caudal view anal segment with but a single pair of short spine-like processes, hind legs uniformly straw colored ..... *N. elongatus*

3. Head about twice as long as wide at base; upper hind corner of anal segment produced into a lobe; a single pair of curved fang-like processes arising from about the middle of the hind margin ..... *N. lautus*

Head long, about three times as long as wide at base, upper hind corner of anal segment not produced into a lobe; processes arising from hind margin straight, tusk-like ..... *N. penilautus*

Neomegamelanus dorsalis (Metcalf)

Pl. 4

Megamelanus dorsalis Metcalf, 1923, Journal Elisha Mitchell Sci. Soc., *38*:199-200.

Brachypterous form: Resembling *elongatus* (Ball) but with four processes on genital tube. Elytra of male uniformly black in color. Length ♂ 2.25 mm., ♀ 3. mm.

Genitalia: In lateral view pygofer longer than broad, irregular in shape (see plate 4); aedeagus slender, elongate, with sides slightly elevated, margins coarsely serrated, apex broadly rounded; a group of four to eight teeth on left side near apex; in caudal view styles about three times as long as wide at base, margins tapering for about two-thirds their length widening apically, inner margin acuminate at apex; ventral margin of anal segment with two pairs of ventrally directed processes; outer pair claw-like opposing each other; inner pair spine-like, half as long as outer pair.

Females similar to males but uniformly orange-yellow in color, some specimens having venter and legs colored as in male; elytra hyaline, the orange-yellow dorsum showing through; ovipositor extending to tip of abdomen.

Male specimens taken from the Florida Keys were much lighter in color than the typical males, the wings being semi-hyaline having only the apical fifth fuscous. Parasitism is common, parasitized males resemble the females quite closely, being uniformly orange-yellow in color; parasitized females are darker in color, some specimens superficially resembling light colored males taken from the Florida Keys.

"*Types*: Holotype ♂, Atlantic City, New Jersey, August 25, W. J. Gehardt; allotype ♀, Atlantic City, New Jersey, August 25, W. J. Gerhardt; paratype ♀, Pascagoula, Mississippi, August 6, 1921, H. L. Dozier."

In Z. P. Metcalf collection.

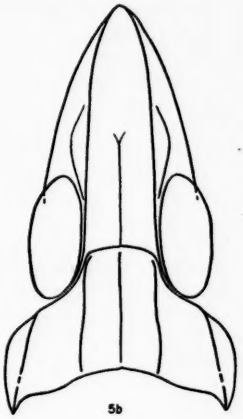
Additional material studied: Florida: Bahia Honde Key, Cedar Key, Long Key, Second Key, Yankee Town; Louisiana: Port Sulphur, Slidell; Maryland: Piney Point. All collected by R. H. Beamer.

EXPLANATION OF PLATE 2

Fig. 3 *Tumidagena terminalis* (Metcalf), lateral view of pygofer and anal segment.
Fig. 3a *Tumidagena terminalis*, ventral view of pygofer showing genital plates.
Fig. 3b *Tumidagena terminalis*, dorsal view of head and pronotum.
Fig. 4 *Tumidagena minuta* n. sp., lateral view of pygofer and anal segment.
Fig. 4a *Tumidagena minuta*, ventral view of pygofer showing genital plates.
Fig. 4b *Tumidagena minuta*, head and pronotum in dorsal view.

PLATE 3

5a



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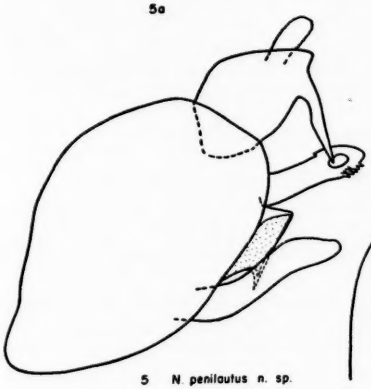
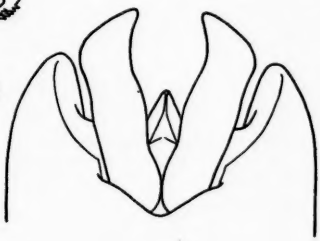


5 N. penilautus n. sp.



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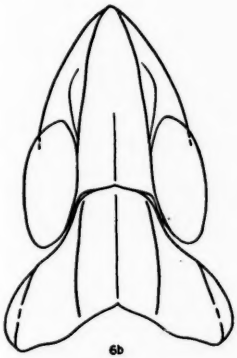

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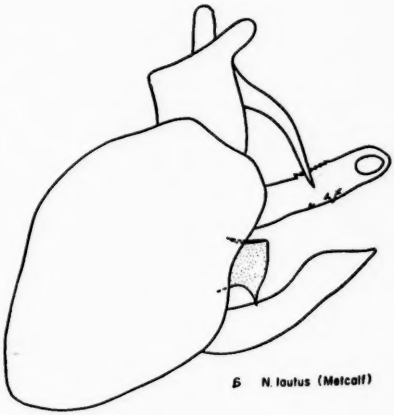


6 N. lautus (Metcalf)

Macropterous form: Like the brachypterous form but with fully developed flight wings. Elytra four times as long as broad, apices broadly rounded; wings hyaline to semihyaline, some specimens having the apical fourth fumose or with a small fumose spot at apex.

The macropterous form closely resembles that of *elongatus* (Ball). The males may be definitely separated on the number of processes on the anal segment, four in *dorsalis* (Metcalf), two in *elongatus* (Ball). The females can be separated by the color of the legs, *dorsalis* being black and white, as is the brachypterous male, and those of *elongatus* being whitish-yellow as in the female of that species.

Holomorphotype ♂, allomorphotype ♀, 10 ♂ and 14 ♀ paramorphotypes, Piney Point, Maryland, August 26, 1946, R. H. Beamer; other paramorphotypes: 22 ♂ ♂ and 3 ♀ ♀, Bahia Honde Key, Florida, July 25, 1948; 5 ♂ ♂, Water Mill, Long Island, New York, August 18, 1946; 1 ♂, Fort Walton, Florida, June 27, 1948; 4 ♀ ♀, Slidell, Louisiana, June 25, 1948; all collected by R. H. Beamer. Types in Snow Entomological Collections.

Neomegamelanus elongatus (Ball)

Pl. 4

Megamelanus elongatus Ball, 1905, Proc. Biol. Soc. Wash., *18*:118-119.

Macropterous form: Resembling macropterous form of *N. dorsalis* (Metcalf) but having two processes on anal segment instead of four and lacking characteristic black and white colored legs as in *dorsalis*. Length of male 2.5 mm. to 4 mm.; of female 4 to 4.5 mm.

Structure: Crown about twice as long as width at base, projecting about half its length in front of eyes; elytra extending beyond end of abdomen a fourth to slightly more than a third their length, four times as long as broad, slightly widening toward apices, apex broadly rounded; veins whitish with a series of rather long black hairs evenly spaced along them; second antennal segment about two and one-half times as long as first, subglobular.

Color: General body color dirty stramineous with an inconspicuous lighter whitish stripe on dorsum extending length of head, pronotum and mesonotum; wings hyaline to semihyaline with variable sized fumose patches at apex; clypeus fulvous, in some specimens with sooty areas along margins and median carina; legs uniformly whitish, tarsal claws, spines on calcar, tibia and tarsi tipped with black; venter with base of segments reddish-brown and caudally margined with yellowish, a few specimens with entire abdomen excepting genital parts ochraceous; genital parts dark reddish-brown.

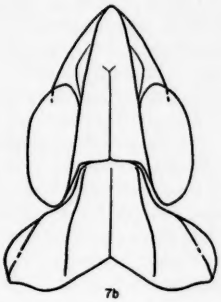
Genitalia: In lateral view pygofer longer than broad, caudal margin broadly rounded (see plate 4); aedeagus slender, elongate, with sides slightly elevated, margins coarsely serrated, apex broadly rounded; a group of from

EXPLANATION OF PLATE 3

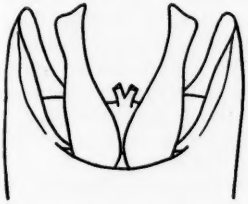
Fig. 5 *Neomegamelanus penilautus* n. sp., lateral view of pygofer and anal segment.
Fig. 5a *Neomegamelanus penilautus* ventral view of pygofer showing genital plates.
Fig. 5b *Neomegamelanus penitautus*, dorsal view of head and pronotum.
Fig. 6 *Neomegamelanus lautus* (Metcalf), lateral view of pygofer and anal segment.
Fig. 6a *Neomegamelanus lautus*, ventral view of pygofer showing genital plates.
Fig. 6b *Neomegamelanus lautus*, dorsal view of head and pronotum.

PLATE 4

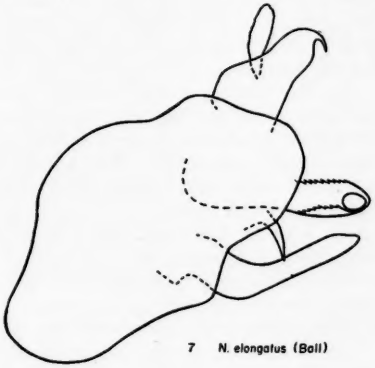
7a



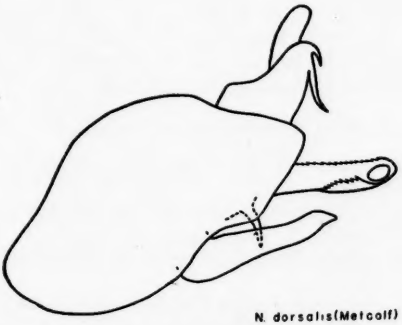
7b



8a



7 N. elongatus (Ball)



N. dorsalis(Metcalf)

EXPLANATION OF PLATE 4

Fig. 7 *Neomegamelanus elongatus* (Ball), lateral view of pygofer and anal segment.
Fig. 7a *Neomegamelanus elongatus*, ventral view of pygofer showing genital plates.
Fig. 7b *Neomegamelanus elongatus*, dorsal view of head and pronotum.
Fig. 8 *Neomegamelanus dorsalis* (Metcalf), lateral view of pygofer and anal segment.
Fig. 8a *Neomegamelanus dorsalis*, ventral view of pygofer showing genital plates.

four to eight teeth on left side near apex; in caudal view styles about three times as long as broad at base, margins tapering for about two-thirds their length then widening apically, inner margin acuminate at apex; anal segment with a pair of stout, short processes, about half as long as dorsal margin in length, ventral margin twice as long as front margin.

Females similar to males, ovipositor extending to end of abdomen.

The macropterous form of this species closely resembles that of *dorsalis* (Metcalf), the males being separated by the number of processes on the genital tube, two in *elongatus*, four in *dorsalis*; the females by the color pattern especially the hind legs, those of *elongatus* being uniformly yellowish-white while those of *dorsalis* are contrasting black and white as in the male.

Types: Lectotype ♂ (here designated) Biscayne Bay, Florida, no further data on pin. In U. S. N. M.

Additional material studied: Connecticut: Mystic, Norwich; Florida: Sanford, Farmdale, Ft. Walton, Twenty-five miles west of Miami; Louisiana: Port Sulphur, Creole, Slidell; Maryland: Piney Pt.; Mississippi: Gulfport, Perlington, Pass Christian, Orange Grove; New York: Montauk, Long Island, Water Mill, Long Island; Virginia: Cape Henry. All collected by R. H. Beamer. Louisiana: Slidell, E. L. Todd; Florida: Sanford, C. O. Bare.

Brachypterous form: Only the females are at hand on which to describe this form. These are like the macropterous form but with the flight wings aborted; elytra about four times as long as broad, apices broad, extending beyond abdomen for about a fifth their length; veins whitish with a series of rather long black hairs evenly spaced along them; elytra hyaline to semihyaline with a small fumose spot at apex; body uniformly white to yellowish-orange in color, legs straw color with tarsal claws, spines on tibia, tarsi and teeth on calcar tipped with black; length female 3.5 to 4 mm.

The female of this form grades imperceptibly into the brachypterous female of *dorsalis* (Metcalf), a large series of both species taken from a number of different areas having specimens difficult to assign to either species.

Types: Holomorphotype ♀, paramorphotypes 21 ♀ ♀, Water Mill, Long Island, New York, August 18, 1946. Other paramorphotypes: Florida: Fort Walton, 15 ♀ ♀, Sanford, 2 ♀ ♀, Mims, 1 ♀; Louisiana: Port Sulphur, 10 ♀ ♀, Creole, 5 ♀ ♀; Maryland: Piney Pt. 18 ♀ ♀; Mississippi: Gulfport, 29 ♀ ♀ Wildwood State Park, Long Island, 2 ♀ ♀; Virginia: Cape Henry, 2 ♀ ♀. All collected by R. H. Beamer. Florida: Wakulla, 1 ♀, E. L. Todd.

Morphotypes in Snow Entomological Collections.

Neomegamelanus lautus (Metcalf)

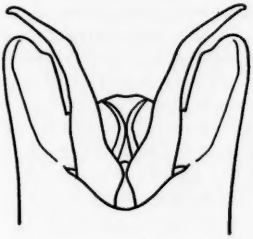
Pl. 3

Megamelanus lautus Metcalf, 1923, Jour. Elisha. Mitch. Sci., Soc., *38*:200-201.

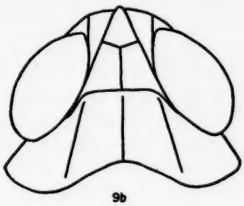
Brachypterous form: Resembles *N. dorsalis* (Metcalf) but elytra brownish fuscous with two characteristic whitish triangles opposing one another at outer fourth, one on front margin and one on the inner margin. Length ♂ 3 - 3.5 mm; ♀ 3.15 - 4 mm.

Except for the contradiction in regard to the anal styles Metcalf's description is accurate. The anal styles are three and one-half times as long as wide at base, with apical fourth acuminate, apices curved inward.

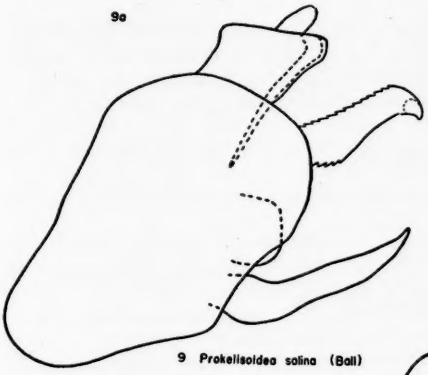
PLATE 5



9a

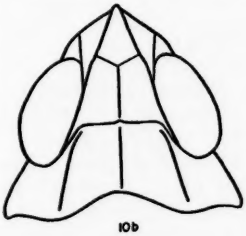


9b

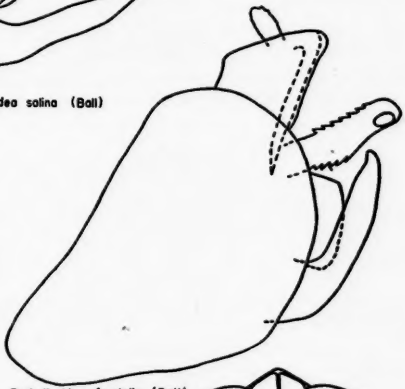


9 Prokelisoidea salina (Bali)

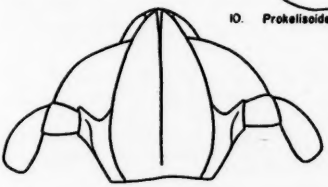
10a



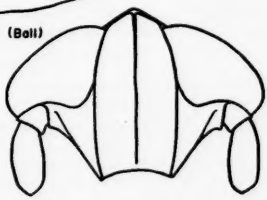
10b



10. Prokelisoidea frontalis (Bali)



11.



10d

Genitalia: In lateral view pygofer irregular in shape, longer than wide, margins regular, hind margin protuberant about level of aedeagus, longest at this point, upper corner broadly rounded (see plate 3); aedeagus with sides compressed, short blade-like, slightly wider just before apex, apex broadly rounded, upper margin coarsley serrate on about middle third, teeth variable in number, sides near lower margin about middle of shaft with a small group of two to five teeth; each side of anal segment with a conspicuous lobe on upper corner of hind margin, about same length as ventral margin of anal segment; styles stout, almost four times as long as wide, equal in width, for basal three-fourths, apical fourth acuminate, apices slightly curve inward.

Additional material studied: Mexico: Vera Cruz, Vera Cruz; Texas: Aransas Pass, Angelton, Brownsville, Corpus Christi, Sinton. All collected by R. H. Beamer.

Macropterous form: Like brachypterous form but with fully developed flight wings; wings extending beyond apex of abdomen about one-fourth their length; color pattern of male similar to brachypterous male, elytra smoky to black with two large whitish triangles opposing one another near apex, one on front margin, one on the inner margin; female with elytra semihyaline to fumose, lacking the characteristic whitish triangles of the male although in some specimens a faint indication of it is present; wing veins of elytra black except in whitish triangles where they are white, veins bearing a number of small black hairs.

Types: Holomorphotype ♂, allomorphotype ♀, 11 ♂ and 14 ♀ paramorphotypes, Brownsville, Texas, December 27, 1945. Other paramorphotypes: Louisiana: Cameron, 1 ♂ and 4 ♀ ♀; Mexico: Vera Cruz, Vera Cruz, 2 ♂ ♂ and 1 ♀; Texas: Brownsville, 10 ♂ ♂ and 11 ♀ ♀, Corpus Christi, 3 ♂ ♂ and 1 ♀; twenty-five miles south of Sarita, 2 ♂ ♂ and 7 ♀ ♀, Sinton, 1 ♀. All collected by R. H. Beamer. Types in the Snow Entomological Collections

Neomegamelanus penilautus n. sp.
Pl. 3

Brachypterous form: Resembling *N. lautus* (Metcalf) and closely related but lacking the lobes on upper hind margin of genital segment and with head about three times as long as wide at base; length ♂ 3 mm.; ♀ 4 mm.

Structure: Head projecting about three-fifths length of crown in front of eyes; elytra extending beyond apex of abdomen for about a fourth their length, four times as long as broad, apex broadly rounded, surface gently undulate; veins black with a series of small black hairs uniformly spaced, distributed along them; second antennal segment about twice as long as first, subglobular.

EXPLANATION OF PLATE 5

Fig. 9 *Prokelisoidea salina* (Ball) lateral view of pygofer and anal segment.
Fig. 9a *Prokelisoidea salina*, ventral view of pygofer showing genital plates.
Fig. 9b *Prokelisoidea salina*, dorsal view of head and pronotum.
Fig. 10 *Prokelisoidea frontalis* (Crawford), lateral view of pygofer and anal segment.
Fig. 10a *Prokelisoidea frontalis*, ventral view of pygofer showing genital plates.
Fig. 10b *Prokelisoidea frontalis*, dorsal view of head and pronotum.
Fig. 10d *Prokelisoidea frontalis*, ventral view of clypeus showing shape.
Fig. 11 *Prokelisia*, ventral view of clypeus showing general shape.

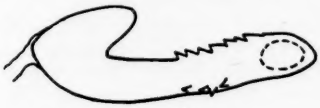
PLATE 6

1. P. salina (Ball)

7. M. bicolor (Ball)

2. P. frontalis (Ball)

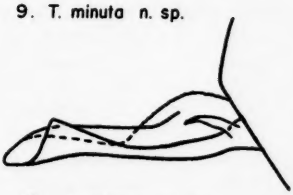
8. T. propinqua n. sp.



3. N. lautus (Metcalf)

9. T. minuta n. sp.

4. N. penilautus n. sp.

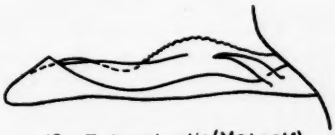


10. T. minuta n. sp.

5. N. elongatus (Ball)

11. T. terminalis(Metcalf)

6. N. dorsalis(Metcalf)



12. T. terminalis(Metcalf)

Color: Dorsal surface of head, prothorax, and mesothorax pale yellowish-white, becoming fuscous at the sides; wings opaque, piceous, a trace of yellow along commissural margin, two large whitish triangles opposing one another at outer fourth of wing, one on front margin and one on inner margin; wings with a highly polished surface; clypeus fuscous, in some specimens an ochraceous line in place of apical portion of median carina; legs uniformly whitish with tarsal claws, spines on calcar, tibia and tarsi tipped with black; venter with base of segments fumose with margins yellowish, genital capsule fumose, one specimen with entire venter including genital capsule straw color.

Genitalia: In lateral view pygofer irregular in shape (see plate 3), hind margin broadly rounded at upper corner, widest at level of aedeagus; aedeagus with sides compressed, shaft phalliform, upper margin free of serrations but may bear a spine near apex, lower margin and sides of shaft free of serration or spines, a small group of teeth at lower margin of glans-like apex; in caudal view styles, five times as long as wide at the middle, apical fourth acuminate, apices slightly curved inward; and segment with a pair of straight, stout processes projecting from posterior ventral margin, about equal to dorsal margin in length.

Females like male but with body uniformly pale yellowish-orange with hyaline to semihyaline elytra bearing a small fumose spot at apex.

Types: Holotype ♂, allotype ♀, 4 ♂ and 3 ♀ paratypes, Big Pine Key, Florida, July 25, 1948, R. H. Beamer; other paratypes: 2 ♀ ♀, Yankee Town, Florida, July 7, 1948, R. H. Beamer; 1 ♀, Yankee Town, Florida, March 9, 1947, R. H. Beamer.

Macropterous form: Only the female has been taken. It resembles the brachypterous male but with fully developed flight wings. The color pattern is essentially that of the brachypterous male but having the crown, pronotum and mesonotum a deep lemon yellow sharply contrasting with smoky-black sides of pronotum and mesonotum.

Holomorphotype ♀, Yankee Town, Florida, March 9, 1947, R. H. Beamer; paramorphotype, 1 ♀, Tampa, Florida, July 20, 1934, R. H. Beamer. Types in Snow Entomological Collections.

EXPLANATION OF PLATE 6

Fig. 1 *Prokelisoidea salina* (Ball), aedeagus in lateral view.
Fig. 2 *Prokelisoidea frontalis* (Crawford), aedeagus in lateral view.
Fig. 3 *Neomegamelanus Lautus* (Metcalf), aedeagus in lateral view.
Fig. 4 *Neomegamelanus penilautus* n. sp., aedeagus in lateral view.
Fig. 5 *Neomegamelanus elongatus* (Ball), aedeagus in lateral view.
Fig. 6 *Neomegamelanus dorsalis* (Metcalf), aedeagus in lateral view.
Fig. 7 *Megamelanus bicolor* Ball, aedeagus in lateral view.
Fig. 8 *Tumidagena propinqua* n. sp., aedeagus in lateral view
Fig. 9 *Tumidagena minuta* n. sp., aedeagus lateral view of left side.
Fig. 10 *Tumidagena minuta* showing aedeagus in lateral view of right side with fang-like spine at base.
Fig. 11 *Tumidagena terminalis* (Metcalf), aedeagus in lateral view, left side.
Fig. 12 *Tumidagena terminalis* showing aedeagus in lateral view of right side with fang-like spine at base.

Prokelisoidea n. gen.

Resembling *Prokelisia* Osborn but clypeus rectangular; resembling *Megamelanus* Ball but without a deep notch in hind margin of pygofer. Head truncate in macropterous form, in brachypterous form may be somewhat pentagonal; lateral carinae of vertex meeting at apex of crown imparting to disc of vertex a triangular appearance; median carina "Y" shaped, obscure in some specimens, extending to front margin of eyes, arms of stem extending obliquely forward to lateral carinae of vertex; a small areolet at apex of crown formed by arms of "Y" shaped median carina and lateral carinae of vertex. Pronotum wider than head, front margin extending into hind margin of crown to about middle of eye; caudal margin sinuate, concave, forming a shallow inverted "V" in outline; tricarinate, lateral carinae straight, diverging moderately and attaining hind margin. Clypeus rectangular, about twice as long as wide at base, lateral margins slightly convex. Calcar two-thirds as long as first tarsal segment including apical spines, strongly and uniformly toothed. First antennal segment as long as wide; second antennal segment twice as long as first.

Type species: *Prokelisoidea salina* (Ball)

Prokelisoidea salina (Ball)

Pl. 5

Kelisia salina Ball, 1902, Can. Ent., *34*:264
Megamelanus salina Beamer, 1945, Jour. Kansas Ent. Soc., *18*:100.

Macropterous form: Resembling *Prokelesia setigera* Osborn but clypeus rectangular with margins slightly convex; resembling *Prokelisoidea frontalis* (Crawford) but styles straight on basal half, sharply diverging on apical half; length ♂ 2 mm.; ♀ 2.5 mm.

Structure. Crown projecting in front of eyes for a third its length, slightly longer than wide at base; lateral carinae of head strongly elevated at base less so anteriorly; straight, meeting at apex of vertex; clypeus slightly more than twice as long as wide at base, slightly convex on sides; pronotum slightly wider than head; elytra hyaline to semihyaline, three times as long as broad, margins subparallel, broadest near apex, extending beyond end of abdomen for about half their length; apex broadly rounded, veins whitish, in some specimens becoming brown near apex of wing, setiferous, with small black hairs, closely appressed behind.

Color: Head, pronotum and mesonotum straw color to bright orange-yellow; abdomen in male varying from smoky to black with caudal margins of segments lighter in color; frontal carinae margined with reddish-brown; legs smoky becoming whitish on hind pair; spines on tibia, calcar, and tarsi tipped with black; tarsal claws black; females similar to males but venter uniformly yellowish in color with the ovipositor and frontal carina margined with brown.

Genitalia: In lateral view pygofer irregular in shape with hind margin broadly rounded, slightly longer than wide, all margins regular; aedeagus in lateral view with apex avicephaliform, upper and lower margins of shaft coarsely serrated except apical third of lower margin which is shallowly concave; in caudal view genital styles four times as long as width at base, widely

diverging and sharply tapering from base to apices; anal segment with pair of long processes at middle about one and one-half times as long as ventral margin and closely embracing aedeagus.

Types: Lectotype ♀, Grand Junction, Colorado, designated by Beamer, Journal Kansas Entomological Society, *18*: July 1945, (3):100. In U.S.N.M.

Additional material studied: Arizona: St. Johns, Chiricahua Mts., Ajo, Flagstaff, Babaquivari Mts., Arivaca; California: Lone Pine, Ventura; Colorado: Peyton, Grand Junction, Palisades; Idaho: Nampa; Kansas: Phillips Co.; New Mexico: Alamogordo, Elkins, Elk, Cowles, Belen, Malaga, Ruidosa, Kenna, Hillsboro, Hope, Grady, Moriority, Mescalero, Roswell, Socorro, Springer, Silver City, Tularosa, Wagonmound, White Sands; Oregon: Dixie; Texas: Coreizo, Ft. Stockton, Laredo, 10 mi. S. E. Pecos, Rocksprings, Vernon; Utah: Elsinore, Glenwood, Goshen; Washington: Toppenish, Sprague.

Brachypterous form: General appearance of brachypterous form of *Megamelanus bicolor* Ball but with elytra extending almost to or beyond end of abdomen; resembling brachypterous form of *Prokelisoidea frontalis* (Ball) but with veins on elytra setiferous with small black hairs evenly spaced; flight wings aborted, about one-fifth as long as elytra; in dorsal view head more pointed than macropterous form being pentagonal rather than truncate. Pronotum much wider than head. Otherwise like the macropterous form. Females with body dirty straw-colored to orange-yellow in some specimens; ovipositor and margin of venter with a few smoky spots.

Material studied: California: Palm City; Colorado: Alamosa, Buckhorn Creek; Kansas: Hutchinson; New Mexico: Alamogordo, Santa Fe, Wagonmound; Utah: Kanab; Wyoming: Laramie. Collected by R. H. Beamer and D. R. Lindsey.

Prokelisoidea frontalis (Crawford)

Pl. 5

Megamelanus frontalis Crawford, 1914, Proc., U.S.N.M. *46*:593.

This species is similar and closely related to *Prokelisoidea salina* (Ball). The brachypterous forms of the two species can be separated by the presence or absence of setae on the veins of the elytra. The setae are present in *P. salina* (Ball) and absent in *frontalis* (Crawford).

Brachypterous form: Resembling *Prokelisoidea salina* (Ball) but no setae on veins of elytra. Length male 2.5 mm.; female 2.5 mm.

Structure: Crown projecting half its length in front of eyes; elytra extending about one-fourth their length beyond end of abdomen in ♂, less in ♀; about three times as long as broad, veins whitish, without setae, more or less pointed at apex, surface pruinose.

Color: Head, pronotum and mesonotum uniformly stramineous; abdomen fumose to blackish; elytra pruinose; apex of head, lateral fovea of head with dark reddish-brown traces; frontal carinae margined with dark reddish-brown; legs straw-colored becoming whitish on hind legs; spines on tibia, calcar and tarsi tipped with black; tarsal claws black; females similar to males but with body uniformly orange-yellow in color.

Genitalia: In lateral view pygofer somewhat triangular, longer than broad, apices broadly rounded, all margins regular (see plate 5); in caudal view

genital styles four times as long as wide at base, widely diverging and tapering from middle to apex; anal segment with a pair of long slender processes at the middle which extend ventro-cephalad to about middle of aedeagus; aedeagus in cross section a narrow wedge; in lateral view shaft with sides parallel, about six times as long as broad, upper and lower margins coarsely serrated except apical third of lower margin which lacks the serrations and is slightly concave; apex broadly rounded.

Types: Holomorphotype ♂, Las Animas, Colorado, August 20, 1936, R. H. Beamer; allomorphotype ♀, Garden of the Gods, Colorado, August 19, 1936, R. H. Beamer; paramorphotypes: 5 ♂ ♂, Garden of the Gods, Colorado, August 19, 1936, R. H. Beamer; 5 ♀ ♀, Las Animas, Colorado, August 20, 1936, R. H. Beamer; 1 ♂ and 5 ♀ ♀, Santa Fe, New Mexico, July 20, 1936, D. R. Lindsey; 1 ♂ and 1 ♀, Stafford Co. Salt Marsh, Kansas, June 25, 1936, R. H. Beamer; 3 ♂ ♂ and 1 ♀, Lamar, Colorado, August 20, 1936, M. B. Jackson; 1 ♂ and 1 ♀, Medora, Kansas, June 24, 1936, D. R. Lindsey; 1 ♂ Vineland, Colorado, August 20, 1936, R. H. Beamer. Morphotypes in Snow Entomological Collections.

LOCALITY RECORDS OF TWO ANTS FOUND IN KANSAS

WALLACE E. LABERGE[1]
Lawrence, Kansas

Two species of ants, for which no previous records from Kansas have been published, were collected by the author during a recent field trip through western Kansas. These are *Formica neoclara* Emery and *Formica perpilosa* Wheeler. *F. neoclara* was taken about seven miles south of Richfield, Morton County, Kansas, September 4, 1951. The colony was located in a large flattened mound (about eight feet in diameter) surrounding the base of a cottonwood tree (*Populus sargentii*) in the sandy soil of a ditch near the Cimarron River. *F. perpilosa* was taken in this same locality tending membracids (*Pubilia* sp.) on *Helianthus annuus* and was also collected on September 5 about two miles northeast of Liberal, Seward County, Kansas. This was also a sandy area along the Cimarron River. The ants in this last locality were collecting nectar from the flowers of *Cleome serrulata* and were tending membracids (*Vanduzea* sp.) on an unidentified legume. The determinations of these ants have been verified by M. R. Smith of the United States National Museum.

Two other collections of *F. perpilosa* have been made in Kansas. The first was at Montezuma, Kansas, June 8, 1934, by Roger C. Smith of Kansas State College. The second was in Thomas County, Kansas, June 8, 1950, by R. H. Painter, also of Kansas State College. Dr. Painter reports that this ant was tending the grain aphid (*Toxoptera graminum*) in Thomas County.

[1]Contribution No. 790 from the Department of Entomology, University of Kansas.

THREE NEW SPECIES OF ANISOPS (Notonectidae, Hemiptera)

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Texas Southern University, Houston

Recently, while studying some Anisops (Notonectidae, Hemiptera) material, I uncovered three new species, one from Africa, one from the Dutch Indies, and one from Ceylon. Their descriptions follow:

Anisops parvula n. sp.
(Pl. I, fig. 1)

Size: Males, length 4.0 mm., greatest body width 1.4 - 1.6 mm.; females, length 4.0 mm., greatest body width 1.5 mm.

Shape. Small, subfusiform species; greatest body width almost midway the body length.

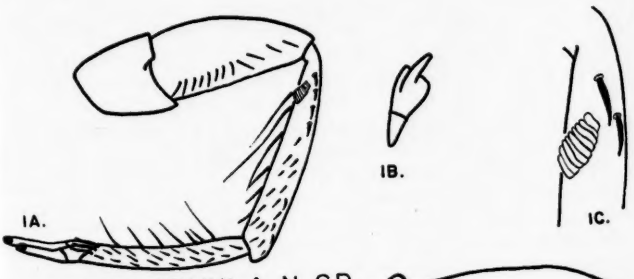
Color: Eyes brown. Vertex and pronotum flavus. Hemelytra flavus and hyaline, may be irregularly tinged with brown at base and just before the apex, the latter also may be tinged with red. Legs stramineous; may have longitudinal brown stripes, hind legs may be irregularly colored red. Abdominal venter dark brown with keel and lateral margins of the connexivum stramineous; keel and lateral margins of connexivum may be tinged irregularly with red.

Male Structural Characteristics: Viewed from above the outline of the head is rounded; greatest width of head nine tenths the pronotal humeral width and six times the anterior width of the vertex; synthlipsis narrow, one fourth the anterior width of the vertex; along the median longitudinal axis the head is equal to or slightly longer than the pronotum. Pronotum with its humeral width slightly more than three times the median length; lateral margins diverging and at least one half the median length; posterior margin almost straight. Facial tubercle slightly raised. Labrum with its basal width equal to its median length, apex rounded. Rostral prong (Pl. I, fig. 1B) shorter than third rostral segment, apex truncate. Stridulatory comb (Pl. I, fig. 1C) of approximately nine stout teeth. Chaetotaxy of the male front leg as shown on Plate I. The relative lengths of the parts of the legs are as follows:

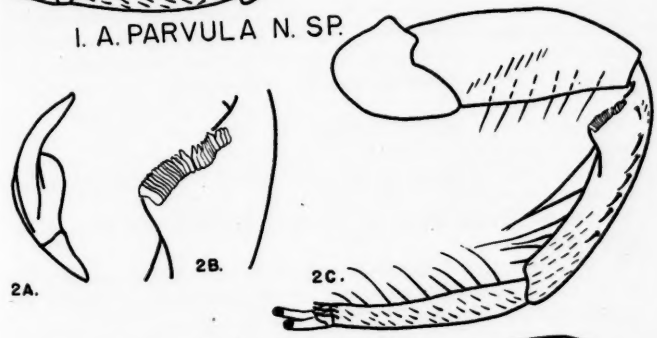
	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	125	82	29
Middle leg	100	92	40	29
Hind leg	100	100	31	23

Female Structural Characteristics: Viewed from above the outline of the head is rounded; greatest width of head almost nine tenths the pronotal humeral width and slightly more than four times the anterior width of the vertex; synthlipsis narrow, slightly less than one third the anterior width of vertex; along the median longitudinal axis the head is almost as long as the pronotum. Pronotum with its humeral width slightly more than its median length; lateral margins slightly diverging and one half the median length;

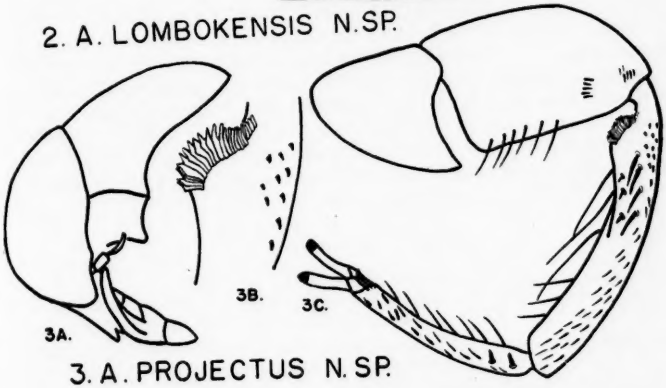
PLATE I



1. A. PARVULA N. SP.



2. A. LOMBOKENSIS N.SP.



3. A. PROJECTUS N. SP.

posterior margin almost straight. The relative lengths of the parts of the legs are as follows:

	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	133	61	40
Middle leg	100	87	39	30
Hind leg	100	104	31	31

Location of Types: Male holotype, female allotype (Africa: Ibadan, Nigeria, II-11-49, B. Malkin) in the California Academy of Science. One male paratype (same distributional data as above), one female paratype (Africa: Ibadan, Nigeria, III-22-49, B. Malkin) in the Snow Entomological Collections.

Comparative Notes: This species by its size and coloration is very similar in general appearance to *Anisops edepol* Kirkaldy. However, the two can be readily separated on the basis of the males, as the male of *A. parvula* lacks the spur-like eminence on its facial tubercle as found on the males of *A. edepol* Kirkaldy.

Data on Distribution: Known only from type series.

Anisops lombokensis n. sp.
(Pl. I, fig. 2.)

Size: Males, length 5.6 mm., greatest body width 1.6 mm.; females, length 5.6 - 6.0 mm., greatest body width 1.6 - 1.8 mm.

Shape: Small, subfusiform species with greatest body width about midway the body length.

Color: General facies dark gray or black. Eyes gray. Vertex and pronotum testaceous, the latter may be tinged with orange, also may have hyaline areas that appear black as it overlies the black scutellum. Scutellum black with its lateral margins tinged with orange or red. Hemelytra hyaline and appearing the black color of the underlying scutellum. Legs stramineous. Abdominal venter black with keel and lateral margins of the connexivum stramineous.

Male Structural Characteristics: Viewed from above the lateral margins of the head are rounded with the anterior margin almost straight; greatest width of head nine tenths the pronotal humeral width and six times the anterior width of the vertex; synthlipsis wide, one half the anterior width of the vertex; along the median longitudinal axis the head is one half as long as the

EXPLANATION OF PLATE I

FIGURE

1. *Anisops parvula* n. sp.
   1A. Inner surface view of male left front leg.
   1B. Left view of third and fourth male rostral segments.
   1C. Enlarged view of left stridulatory comb.
2. *Anisops lombokensis* n. sp.
   2A. Left view of third and fourth male rostral segments.
   2B. Enlarged view of stridulatory comb.
   2C. Inner surface view of male left front leg.
3. *Anisops projectus* n. sp.
   3A. Left view of male head and pronotum.
   3B. Enlarged view of left stridulatory comb.
   3C. Inner surface view of male left front leg.

pronotum. Pronotum with its humeral width two times its median length; lateral margins diverging and one half the median length; posterior margin convex, medianly emarginate. Facial tubercle slightly raised. Labrum with its basal width slightly more than its median length. Rostral prongs (Pl. I, fig. 2A) shorter than third rostral segment. Stridulatory comb (Pl. I, fig. 2B) of approximately twenty-five teeth. Chaetotaxy of male front leg as shown on Plate I. The relative lengths of the parts of the legs are as follows:

	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	110	82	
Middle leg	100	80	38	25
Hind leg	100	85	32	32

Female Structural Characteristics: Viewed from above the outline of the head is rounded; greatest width of the head eight tenths the pronotal humeral width and almost six times the anterior width of the vertex; synthlipsis wide, one third the anterior width of the vertex; along the median longitudinal axis the head is slightly more than one half the length of the pronotum. Pronotum with its humeral width slightly more than twice its median length; lateral margins diverging and slightly more than one half the median length; posterior margin convex, medianly emarginate. The relative lengths of the parts of the legs are as follows:

	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	118	35	32
Middle leg	100	88	38	28
Hind leg*				

Location of Types: Male holotype, female allotype, one male paratype (Lombok, Sapit, 2000', 1896, H. Fruhstorfer) in the Snow Entomological Collections.

Comparative Notes: Very similar to *Anisops cleopatra* Distant from which it can be separated on the basis of the males. The males of *A. cleopatra* lack the almost straight anterior margin of the head as found on this species. Also the stridulatory comb of the two are shaped differently, that of *A. lombokensis* having its shortest teeth basally located whereas the shortest teeth of *A. cleopatra* are apically placed.

Data on Distribution: Known only from type series.

Anisops projectus n. sp.
(Pl. 1, fig. 3.)

Size: Males, length 6.4 mm., greatest body width 1.9 mm; females, length 6.8 mm., greatest body width 2.0 mm.

Shape: Small, subfusiform species with greatest body width about midway the body length.

Color: *Dark form*: General facies black. Eyes gray. Vertex stramineous. Pronotum dark brown, almost black. Scutellum black. Hemelytra hyaline and appears black as it overlies the black dorsal body surface, may be tinged with

*No hind leg on the single female specimen at hand.

red at base. Legs stramineous. Abdominal venter black with keel and lateral margins of the connexivum stramineous. *Pale form*: General facies stramineous. Abdominal venter black with keel and lateral margins of the connexivum stramineous.

Male Structural Characteristics: Viewed from above the lateral margins of the head are rounded with the anterior margin almost straight; greatest width of the head nine tenths the pronotal humeral width, slightly more than five times the anterior width of the vertex; synthlipsis wide, almost seven tenths the anterior width of the vertex; along the median longitudinal axis the head is one-fifth the length of the pronotum. Pronotum with its humeral width one and one half its median length; lateral margins convex and diverging, slightly less than one half the median length; posterior margin convex; anterior half of dorsal pronotal surface with two slight depressions, one on either side of the median line. Facial tubercle (Plt. I, fig. 3A) raised and terminating in a short acuminate process. Labrum almost completely hidden by the facial tubercle. Rostral prongs (Pl. I, fig. 3A) shorter than third rostral segment. Stridulatory comb (Pl. I, fig. 3B) of approximately twenty-five teeth. Chaetotaxy of male front leg as shown on Plate I. The relative lengths of the parts of the legs are as follows:

	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	123	73	
Middle leg	100	80	35	25
Hind leg	100	83	37	37

Female Structural Characteristics: Viewed from above the outline of the head is rounded; greatest width of head nine tenths the pronotal humeral width and six times the anterior width of the vertex; synthlipsis wide, three fourths the anterior width of the vertex; along the median longitudinal axis the head is almost one third the length of the pronotum. Pronotum with its humeral width one and one half its median length; lateral margins convex and diverging, less than one half the median length; posterior margin concave. The relative lengths of the parts of the legs are as follows:

	Femur	Tibia	1st. Tar. Seg.	2nd Tar. Seg
Front leg	100	123	48	32
Middle leg	100	80	40	30
Hind leg	100	90	34	34

Location of Types: Male holotype, female allotype, six male paratypes, one female paratype (Nalanda Ceylon; Horn) in the Snow Entomological Collections.

Comparative Notes: By its long pronotum, wide interocular space, and shape of the male front legs, the males of this species are quite similar to *A. paranigrolineata* Brooks from which it can be readily separated on the fact that the males of the latter species lack the acuminate eminence as found on the facial tubercle of the males of *A. projectus*.

Data on Distribution: Known only from type series.

THE MALE OF CULICOIDES WEESEI KHALAF (Heleidae, Diptera)

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The original description of this species (Khalaf, Ann. Amer. Ent. Soc.,-in press) was based upon the female since the male was not known at that time. In the present work on light trap collections, from Pond Creek (Oklahoma,) this species was found to be the most abundant, and more than one hundred males were available for study, while in Wichita Refuge (Oklahoma) the occurrence of this species was described as being occasional.

The male is like the female: without wing spots or mesonotal pattern, legs yellow without bands or dark knees, it is also light in color and the wings often appear with yellowish tinge. The species superficially resembles *Culicoides simulans* R. and H., especially when the wing spots are faded in the latter species on preservation. However, it could be directly distinguished from *C. simulans* R. and H. by the uniform color of legs. This characteristic was also utilized in differentiating *C. weesei* from *C. salihi* Khalaf, (Khalaf, Ann. Amer. Ent. Soc.,-in press).

The male hypopygium is quite distinct. The apicolateral processes are conspicuously well developed and are divergent. The membrane ventral to the aedoeagus is spinose. Few spines are present opposite the tip of the arch of the aedoeagus. The arch of the aedoeagus high; the terminal portion short and truncate with few microspines near tip on the inside. The harpes with stout slender stem, the tip slightly tapering and curved laterally, the base more or less foot-shaped. The inner processes of the sidepiece, which are more slender than the dorsal processes, curve around the base of the harpes.

Allotype, male, Pond Creek (Okla.), July 21, 1948; with about one hundred male paratypes, Pond Creek (Okla.), 1948.

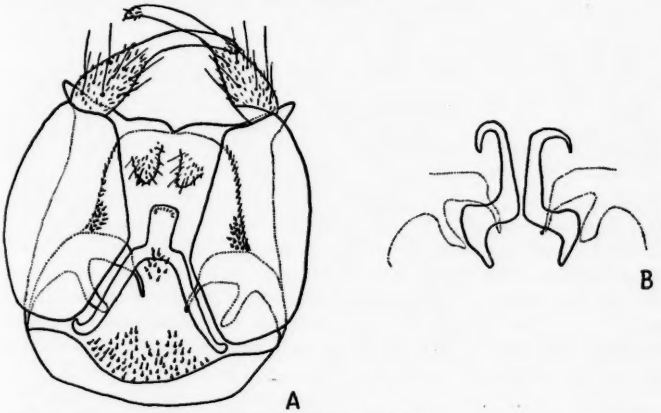

Fig. 1. the male genitalia of *C. weesei* Khalaf, A.) hypopygium with harpes removed, B.) harpes and processes of the sidepiece.

A STUDY OF THE BACTERIAL FLORA OF CERTAIN GALL WASPS (HYMENOPTERA, CYNIPIDAE) AFFECTING SCRUB OAK (QUERCUS GAMBELII NUTT.)*

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University of Utah

INTRODUCTION

While engaged in a taxonomic and ecological study of the *Cynipid* wasps producing galls on the common scrub oak (*Quercus gambelii* Nutt.) of northern Utah, the authors became interested in the possible presence of microorganisms that might be associated normally with the insect host, both as symbionts and as possible adjuncts to the production of the gall and as enteric contaminants of the gall. Since Kostoff and Kendall (1929) reported that numerous microorganisms were present between the insect host and the plant and in the nutritive layer during incipient gall formation, subsequent experiments were directed primarily toward recovering and culturing bacteria from the surfaces of the insect and the inner wall of the gall. Efforts were also made to recover bacteria from the alimentary tract of the insect.

MATERIALS AND METHODS

Of the numerous species of Cynipidae affecting this species of oak, those used in the experiments were *Xanthoterus eburneum* Bass. (gamic generation, spring emergence), *Cynips hirta undulata* (Gillette) Kinsey (agamic generation, autumn emergence), and *Andricus pilula* Bass. (gamic generation, spring emergence), all of which produce galls on the leaf. In order to avoid the possible confusion of *Cynipids* with guest flies and parasites which have, as a rule, different times of emergence, only galls containing mature larvae, pupae, or adults were used.

The galls were placed in 70 per cent alcohol for at least 10 minutes. Tests showed that this treatment killed most, if not all, surface bacteria. Some of *Cynips* galls were left in the alcohol for as long as one hour without adversely affecting the insect within. The walls of the *Cynips* galls are very resinous and seem to be extremely impermeable. The galls examined were opened with sterile needles and the larva, pupa, or adult whichever was present in the gall, was carefully removed with the needle. These were either placed in test tubes and crushed in a sterile isotonic saline solution (1.2%) or placed directly onto nutrient media. Eighty insects were used in the experiment. These were approximately equally divided between the three species. In a few cases, live larvae were placed on nutrient agar plates and allowed to pupate and emerge as adults. Such organisms were left on the sterile agar until they died approximately 3 weeks later.

*This project was carried on with funds received from the University of Utah Research Fund.

Both aerobic and anaerobic techniques were used in each attempt to isolate the bacteria. The basic growth media consisted of Difco nutrient agar to which accessory factors were added in most instances. In one series, 1 per cent dextrose was added. Cellulose in the form of finely divided filter paper was also added to the basic media and to the dextrose media. In other attempts, an extract of soil from beneath the oak was used with the agar. In still another series, a special synthetic media developed by McIntire, Peterson, and Riker (1942) for growing crown gall organisms (*B. tumefaciens*) was used. In attempts to provide growth factors, yeast extract (Difco) was added to the nutrient agar in a number of cases. Finally, an extract of the gall and oak leaves was prepared and added to the nutrient media. This extract was prepared by grinding leaves and galls together with a small amount of distilled water in a Waring blender. The resultant preparation was passed through a paper filter, part was then sterilized by autoclaving and the remainder was sterilized by filtering through a Seitz filter. In attempts to demonstrate anaerobic organisms, Burri tubes were used for deep agar cultures as well as Difco fluid thioglycollate media in test tubes. The Burri tubes consisted of quarter-inch glass tubing 24 inches long closed at one end with a cork sealed with hot paraffin and at the other end with a cotton plug. The insects were crushed with a sterile glass rod in 3 ml. of sterile isotonic solution in a test tube and this then was poured into cooled liquid agar, stirred, and then poured into the tubes. Insect material in sterile saline was also introduced into the thiogly-collate media. The cultures were incubated for at least 2 weeks at 27°C. Preparations of the larvae and the galls were examined carefully for microorganisms with the miscroscope.

RESULTS AND DISCUSSION

With the exception of a few obvious air contaminants, all attempts to culture bacteria were negative. Microscopic examination of material from galls also failed to reveal bacteria. It was concluded that either there were no bacteria present, either associated with the insects or in the interior of the galls of the species examined, or that the plant may have destroyed such foreign bacteria that may have been introduced with the egg of the wasp. It is also possible that the various media used failed to provide some substance essential for growth. The presence of some specialized form of microorganisms symbiotic or commensal to the gall or insect might be demonstrated by the use of other media.

The absence of bacteria in the alimentary tract of the insect could be attributed to destruction by the digestive processes. It is known that some parasitic and semi-parasitic arthopods are apparently devoid of bacterial flora in the alimentary tract. Duncan (1926) believes that some substance inimical to bacterial growth is produced by the host tissue in these forms, and the present experiments seem to substantiate this opinion. Cynipidae which develop under somewhat specialized conditions in living plant tissue would probably have a greater possibility of being bacterially sterile than active insects such as the flies and mosquitoes tested by Duncan.

It is possible that bacteria on the surface of the oak leaves are introduced into the plant tissue when the female wasp introduces the egg. Such bacteria

may multiply to some extent in the wound and in the developing gall tissue. It may be that these bacteria are responsible for the death of some of the wasp larvae that fail to reach maturity. This may possibly explain why, without evidence of parasitism by other Hymenoptera, as high as 20 per cent of the larvae in *Cynips* galls were found to be dead.

In normal larval development, plants are apparently capable of destroying bacterial contaminants in their tissues and can acquire immunity against certain antigenic agents. Evidence of this in oak is reported by Kostoff (1928). The various species of oak seem to be able to withstand invasion by bacteria better than many other genera of plants as evidenced by the few bacterial diseases which afflict them. In addition, it may be significant that oak also are host for a very large number of highly successful insect gall formers. Even when gall infection is heavy the plants do not seem to be adversely affected. Since bacteria are apparently absent, it is possible that the wound, egg and larval hormones are entirely responsible for gall formation.

Results obtained from rearing larvae through the adult stage on nutrient agar in petri dishes also indicated that bacteria were absent on the insect's surfaces and in the insect's alimentary tract. The adult wasp's behavior inside the petri dish seemed quite normal during the whole period and the cause of death was probably due to the exhaustion of the fat body since it is doubtful if the adult wasps take nourishment even in nature.

SUMMARY

Numerous attempts were made to culture bacteria from the gall wasps and galls of three species affecting the scrub oak, *Quercus gambelii* Nutt. The insect species investigated, *Xanthoterus eburneum* Bass., *Andricus pilula* Bass., and *Cynips hirta undulata* (Gillette) Kinsey, all produced galls on the leaves of the plant. Only mature larvae, pupae, or adults were used. All trials were negative. Numerous kinds of media were used and both aerobic and anaerobic methods were employed. The results with the media used indicated that the digestive tracts as well as the inner cell of the gall containing the insect larvae were sterile. The adults, some of which were reared for several weeks on nutrient media, were also shown to be free of bacteria.

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CELERY FIELD APHIDS IN UTAH*

G. F. KNOWLTON and M. A. PALMER

Western celery mosaic has at times caused severe financial losses to celery growers in Utah. Greatest losses from this disease occurred during 1946, when a high percentage of the crop was unmarketable and many fields were complete failures. Losses were substantial in some celery fields in 1947 and 1951.

Essig[1] reported that 11 species of aphids bred on celery in California, and may be considered as potential pests. Severin and Freitag[5] recorded 10 of these species as virus vectors of western celery mosaic. In addition, they transmitted the virus from diseased to healthy celery plants by means of *Aphis rumicis L. and Cavariella theobaldii* (Gillette), species recorded as found on celery in other states but which had not been taken on celery in California. Six species of noncelery feeding aphids were tested and all proved to be vectors. Thus the influx of winged aphids into celery fields, which goes on throughout the season in Utah, and is especially conspicuous in fall, doubtless plays an important supplementary role in the spread of western celery mosaic virus whenever diseased plants are present in a celery growing area.

Knowlton[3] in a preliminary report, listed *Aphis helianthi* Monell, *A. helichrysi* Kalt., *A. heraclella* Davis, *Cavariella aegopodii* Scop., *C. pustula* Essig, *Myzus persicae* (Sulzer), and *Macrosiphum* sp. nymphs from celery in Utah.

The present report, based on a re-examination of past collections and a study of a substantial number of field collections made since 1948 uses names for the species as they will appear in "Aphids of the Rocky Mountain Region", by M. A. Palmer.[4]

Aphis heraclella Davis has been taken on celery at American Fork, Beaver, Brigham, Corinne, Deweyville, Farmington, Geneva, Honeyville, Magna, Midvale, Murray, Riverdale and West Jordan. In addition, it has been collected in many localities on various wild and cultivated Umbelliferae. County weed control programs during the past four years have greatly reduced the abundance of wild parsnip and other wild Umbelliferae host plants of this species in most commercial celery growing areas. Such weed control programs have had beneficial effects in reducing aphid numbers in many areas.

A. armoraciae Cowen [*Aphis middletoni* Thomas in Gillette and Palmer, Ann. Ent. Soc. Amer. 25:418, 1932, and others] was present on celery at Corinne, September 25, 1949, and was taken on celery south of Salt Lake City during June and July, 1948. It was taken on *Pastanaca sativa* at Benson, Brigham, Salt Lake, and Springville, and on *Cicuta douglassii* at Bear River City.

A. gossypii Glover was collected from celery at Kaysville, June 28, 1949, and at Farmington on September 13, 1950. It was also taken from wild parsnip and poison hemlock.

A. helichrysi Kalt. was collected from celery at Kaysville, June 28, 1949.

A. tulipae Boyer was collected on celery at Corinne, October 4, 1949. It was found infesting celery in a Utah Agricultural Experiment Station greenhouse

*Contribution from the Entomology Departments, Utah and Colorado Agricultural Experiment Stations.

at Logan, September 24 and October 31, 1947. Also it was found damaging carrots in storage at Logan, February 16, 1942; and on *Pastinaca sativa* at Hunter, July 14, 1948.

Amphorophora sonchi Oestlund apterae and alatae were taken on celery at Corinne, October 22, 1949, and at American Fork, September 29, 1940. Winged forms were taken on celery at Provo.

Cavariella aegopodii Scop. [*C. capreae* (Fabricius) in Gillette and Palmer, 466, 1932] has commonly been found on celery in Utah. Collection records on this host included American Fork, Corinne, Geneva, Honeyville, Pleasant Grove, Provo, Riverton, Salt Lake City, and Springville. It is also common on various cultivated and wild Umbelliferae. It has been seriously damaging to carrots and dill at Logan.

Myzus circumflexus (Buckton) was numerous on celery in the College greenhouse at Logan, December 17, 1945 (Knowlton-Ted Tibbetts).

M. persicae (Sulzer) was taken on celery at Corinne, Farmington, Honeyville, Kaysville, Midvale, and South Salt Lake City. Also, it was collected from water hemlock at Murray, July 5, 1947, and on celery in the greenhouse at Logan.

M. solani Kalt. [*M. pseudosolani* Theobald in Gillette and Palmer, 27: 206, 1934] was taken on celery at Farmington, July 28, 1948.

Macrosiphum spp. nymphs on celery, were taken at Corinne, Honeyville, and Provo.

Rhopalosiphum conii Davidson [*R. melliferum* (Hottes) in Gillette and Palmer, 25:484, 1932] was taken on celery at American Fork, Farmington, Kaysville, Midvale, West Jordan, and South Salt Lake City. This species sometimes is abundant on *Cicuta douglassi, Conium maculatum*, cultivated and wild carrot, *Heracleum* and *Pastanaca sativa.*

Aphids in flight are common and especially abundant in the fall. Species taken in Utah on celery, as winged forms not definitely known to breed on celery, include the following:

Aphis bakeri Cowen at Farmington, September 27, 1950.

A. cardui L., Bear River City and Corinne, in October.

A. cerasifoliae Fitch, Farmington, August 11, 1950.

A. crypta Pack-Knlt., Deweyville, August 5, 1943.

A. crataegifolii Fitch, American Fork, September 1, 1950.

A. kachena Hottes at Honeyville and Magna in October.

A. neilliae Oest. (?) at Farmington, June 28, 1949.

A. sensoriata G.-B., Rear River City, October 18, 1947.

A. viburniphila Patch, American Fork, September 27, 1950.

A. vorabonnevilla K.-S. at Honeyville, October 18, 1947 (Knowlton-B. A. Haws).

Brevicoryne brassicae (L.) at Murray, September 27, 1950.

Capitophorus hippophaes Koch, Farmington, September 8, 1950.

Eriosma lanigerum (Hausm.), Murray, September 27, 1950.

Hyalopterus arundinis (Fab.), Farmington, July 28, 1948.

Macrosiphum barri Essig, American Fork and Murray, September 27, 1950.

M. dirhodum (Walker), American Fork, August 28, 1950; Midvale, July 20, 1948 (Knowlton-H. E. Dorst).

M. granarium (Kby.), Farmington, August 8, 1950, Kaysville and Salt Lake City, July 20, 1948.

M. pisi (Kalt.) at American Fork, Farmington, Honeyville, and in other localities.

M. rosae (L.), Midvale, September 6, 1950.

Myzocallis sp., Farmington, September 27, 1950.

Myzus lythri Schrank [*M. mahaleb* Koch in Gillette and Palmer, 27: 203, 1934] at American Fork, September 27, 1950.

Periphyllus negundinis (Thomas), Provo, September 27, 1940.

Rhopalosiphum fitchii (Sand.) [*R. prunifoliae* (Fitch) in Gillette and Palmer, 25:486] at Farmington, August 11, 1950 and Midvale, July 8, 1947 (Knowlton-H. E. Dorst).

R. maidis (Fitch) [*Aphis maidis* Fitch in Gillette and Palmer, 25:415, 1932] American Fork, August 28, 1950, and Farmington, August 7, 1949.

Toxoptera muhlenbergia Davis, Farmington, August 8, 1950.

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A MONOGRAPHIC STUDY OF THE AFRICAN[1] BIBIONIDAE (Diptera)

PART III, GENUS PLECIA

D. ELMO HARDY[2]

The genus *Plecia* is the only representative of the Pleciinae that occurs in the Ethiopian region. The *Plecia* are split into two subgenera, *Plecia* (*Plecia*) and *Plecia (Pleciodes)*. The latter is herein described as new and contains but one known species. *Plecia* (*Plecia*) is well developed throughout the region, as it is throughout the tropics and subtropics of the world. The group is now known to contain twenty-six species from the Ethiopian region. Nine of these are being described as new in this paper.

This study has been conducted over a period of several years and material has been examined from many entomologists and institutions throughout Europe, Africa, Madagascar, and the United States. Several thousand specimens have been studied, probably representing the greater part of the Ethiopian *Plecia* which are in collections. The writer is much indebted to the many entomologists whose cooperation has made this study possible.

Key to the Plecia of the Ethiopian Region

Based upon males.

1. Cubital cell closed and petiolate (fig. 1a); thorax all rufous except for a velvety black line extending from wing bases to humeri; very large species, 9.5 - 14.0 mm. (East Central Africa, South into S. Rhodesia).....*Plecia (Pleciodes) ephippium* Speiser

   Cubital cell open wide; thorax not as above; smaller species, body not over 8.0 mm. in length, usually less than 6.0 mm. .....*Plecia (Plecia)* 2

2. Chiefly or entirely black species 3

   At least mesonotum chiefly or entirely rufous 10

3. Wings brown fumose along the veins and crossveins; the remainder of the wing membrane is yellowish fumose; the ninth sternum with a well developed lobe on each posterior lateral margin and with a pair of small lobes just inside the claspers (fig. 6a, Hardy, 1948); claspers long and slender; ninth tergum cleft nearly to its base (fig. 6b, Hardy, 1948). ....*(Uganda)....fuscinervis* Hardy

   Wings not darker along the veins or crossveins; genitalia not as above 4

4. Wings conspicuously yellow, especially along the anterior margin; large species, 7.0-8.0 mm; ninth tergum with a strong process in the middle of the hind margin; claspers divided into two lobes at apices (fig. 1b, Hardy, 1949).....*(Madagascar)* .....*gilvipennis Hardy*

[1] Including Madagascar.

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Wings not yellow; smaller species, 4.0 - 5.0 mm. (except for *robusta* Hardy); ninth tergum without such a median process; claspers not bilobed 5

5. Femora tinged with yellowish to red; ninth sternum bilobed on each side at apex; claspers large and quadrate in shape (fig. 5a); ninth tergum cleft almost to base on hind margin (fig. 5b)..... (Cameroons)..... *insolita* n. sp.

Legs black; genitalia not as above; claspers more slender, etc. 6

6. Ninth tergum strongly developed on the posterior lateral margins into a pair of sharp pointed incurved (forcep-like) lobes (fig. 12a); tergum nearly divided into two plates, cleft deeply on the hind margin so just a narrow sclerotized bridge joins the two lobes 7

Ninth tergum not developed into strong lateral lobes and not so deeply cleft on the hind margin 8

7. Lobes of hind margin of ninth tergum rather short, not elongate and slender, and shorter than the remainder of the tergum (fig. 2a, Hardy, 1949); hind margin of ninth sternum without lateral lobes; claspers slender and curved outwardly (fig. 2b Hardy, 1949) ..... (Madagascar)..... *madagascarensis* Hardy

Lobes of tergum elongate and slender, three times longer than the remainder of the tergum (fig. 12a); ninth sternum with a strong spine-like lobe at apex on each side (fig. 12b); claspers slightly enlarged at tips and with a small point on the inner apices (fig. 12c) ..... (Mbamba-Bai)..... *zernyi* n. sp.

8. Claspers slender, three or four times longer than wide (fig. 3b); posterior lateral margins of ninth tergum broadly bilobate (fig. 3a) ..... (Belgian Congo and Central Africa) ..... *erubescens* Speiser

Claspers short and broad, not over one and one-half times longer than wide; ninth tergum not as above 9

9. Hind margin of ninth tergum with a narrow 'U'-shaped cleft in the middle (fig. 13, Hardy 1950); posterior lateral margins of ninth sternum lobate (fig. 14, Hardy, 1950) ....(Belgian Congo) ..... *robusta* Hardy

Hind margin of tergum nearly straight and with a bilobed projection from the median portion (fig. 9, Hardy 1950); posterior lateral margins of sternum not lobate (fig. 8, Hardy, 1950) ..... (Belgian Congo)..... *wittei* Hardy

10. Thorax all rufous 11

Pleura chiefly black or dark brown 14

11. Abdomen yellow pilose; ninth sternum strongly developed into a pair of lateral lobes which are about equal in length to the claspers; a pair of strong lobes are also present just inside each clasper, on posterior margin (fig. 9a, Hardy, 1948); ninth tergum cleft nearly to its base, the lateral lobes are strongly forcipate (fig. 9b, Hardy 1948); wings pale yellowish fumose ..... (Uganda and S. Rhodesia) ..... *ugandaensis* Hardy

Abdomen usually all black pilose; genitalia not as above; wings yellow-brown fumose 12

12. Ninth tergum with a pair of median lobes on the hind margin, separated by a small 'v'-shaped cleft (fig. 1b, Hardy, 1948); inner margin of tergum not bearing teeth; claspers about three times longer than wide 13

Tergum without well developed median lobes and with a deep 'U' shaped concavity on the hind margin (fig. 7b, Hardy, 1948); inner margin of tergum, as seen from end view, armed with strong teeth (fig. 7c, Hardy, 1948); claspers short and thick, not much longer than wide.....(E. Central Africa) .... *octodentata* Hardy

13. Claspers square tipped (fig. 10b); median lobes of ninth tergum broad and rounding (fig. 10a) .....(W. Central Africa) ..... *scenica n. sp.*

Claspers pointed at apices (fig. 1a, Hardy, 1948); median lobes of ninth tergum rather acute (fig. 1b, Hardy, 1948)..... (Belgian Congo) ..... *aliena* Hardy

14. Mesonotum entirely rufous 15

Front margin of mesonotum with a large dark brown to black spot in the middle 19

15. Ninth tergum and sternum fused at the sides, not distinctly divided into two sclerites; a strong curved spine is present on each side of the ventral portion of the genitalia (fig. 2b); claspers slender and simple 16

Ninth tergum and sternum not fused; no such spine present; claspers well developed and bilobed at apices (fig. 11b) 17

16. Genitalia strongly forcipate (fig. 2b), the lateral lobes are greatly elongated and slender; the ventral spines extend scarcely to the bases of the lateral lobes (fig. 2b); claspers with no conspicuous basal lobes.....(W. Central Africa)..... *elongata* n sp.

Genitalia not so developed, lateral lobes short and thick, scarcely longer than the large ventral spines (fig. 11b, Hardy, 1948); claspers each with a conspicuous well developed basal lobe .....(E. Central Africa)..... *uncinata* Hardy

17. Ninth sternum with a pair of strong lobes on each side, the inner pair are heavily sclerotized, pointed and clasper-like in appearance (fig. 4b, Hardy, 1948); claspers not deeply bilobed 18

Ninth sternum with a single broad, blunt lobe on each side (fig. 11b); claspers split to about their middles, the lobes are well developed (fig. 11b) .....(Central Africa) ..... *yabaensis* n. sp.

18. The outer lobe of the pair on each side of the apex of the ninth sternum is much more strongly developed than is the inner, it extends well beyond the apices of the inner lobe and of the claspers (fig. 6b) .....(West and Central Africa) ..... *malkini* n. sp.

The outer lobe is scarcely half the length of the inner and extends about half way to apices of the claspers (fig. 4b, Hardy 1948).....(Widespread across Central Africa) ....*bilobata* Hardy

19. Ninth tergum deeply concave on the hind margin, cleft nearly to its base 22

Ninth tergum gently concave on hind margin, not deeply cleft 20

20. Ninth tergum with a large apical projection in the middle (fig. 5a, Hardy, 1948); claspers very broad, not over two times longer than their greatest width (fig. 5b, Hardy, 1948) ..... (Uganda) ..... *curta Hardy*

Ninth tergum without such a development; claspers slender, four or more times longer than wide 21

21. Posterior lateral margins of ninth sternum strongly lobate, extending beyond apices of claspers (fig. 4b); each clasper with a small acute basal lobe; posterior lateral margins of ninth tergum broadly bilobate (fig. 4a) ..... (Nyasaland) ..... *freemani* n. sp.

Lateral margins scarcely produced beyond remainder of hind margin of ninth sternum and not extending to apices of claspers (fig. 9b); claspers without basal lobes; tergum not lobate on posterior lateral margins (fig. 9a) ..... (South and East Africa) ..... *ruficollis* Fab.

22. Ninth sternum with a strong spine or finger-like lobe at apex on each side (fig. 8b); tergum with a broad 'U' shaped concavity on hind margin in middle (fig. 8a) 23

Ninth sternum not so developed, with a pair of variously developed lobes on each side; ninth tergum either with a very narrow 'U' shaped concavity in middle (fig. 8a, Hardy, 1948) or with the hind margin gently sloped (fig. 2b, Hardy, 1948) 24

23. Lateral lobes of tergum slender, tapered and pointed at apices (fig. 8a); lobes at apex of sternum spine-like (fig. 8b) ..... (Uganda) ..... *redunca* n. sp.

Lobes of tergum broad almost square at apices, not tapered (fig. 7a); lobes of sternum rounded at apices (fig. 7b) ..... (East Africa) ..... *quadrata* n. sp.

24. Claspers divided into two apical lobes (fig. 3a Hardy, 1948) 25

Each clasper with a basal lobe, not divided at apices 26

25. Lateral lobes on hind margin of ninth sternum strongly developed, extending much farther than the inner lobes or the claspers; inner lobes and claspers developed as in figure 3a, Hardy, 1948; ninth tergum divided into two plates (fig. 3b, Hardy, 1948) ..... (Uganda) ..... *bidens* Hardy

Lateral lobes small, much shorter than the inner lobes or the claspers; sternum and claspers developed as in figure 4b, Hardy, 1948; ninth tergum not divided (fig. 4a, Hardy, 1948) (Atypical specimens may run here) ..... *bilobata* Hardy

26. Basal lobe of each clasper spine-like and bare, apical lobe long and slender (fig. 2a, Hardy 1948); tergum two times wider than long (fig. 2b, Hardy, 1948) ..... (Uganda) ..... *basalis* Hardy

Basal lobe not spine-like and densely bristled, apical lobe rather short and thick (fig. 8b, Hardy, 1948); tergum as long as wide (fig. 8a Hardy, 1948) .....(Uganda).....*sana* Hardy

Plecia (Pleciodes) new subgenus

This subgenus is distinguished from *Plecia* (*Plecia*) by having the cubital cell in the wing closed and petiolated (fig. 1a). This characteristic is so striking that it would certainly seem to justify setting *Pleciodes* off as a distinct genus. Considered from the standpoint of just the Ethiopian region, there are ample supporting characters to treat this as a genus. When the Pleciinae are studied, however, from a world standpoint, these supporting characters are not entirely reliable and it is perhaps best that *Pleciodes* be considered a subgenus of *Plecia.*

In *Pleciodes* the costa extends about one-third the distance between the ends of veins R_{4+5} and M_1, and does not reach the actual apex of the wing. In *Plecia* the costa usually extends half the distance between the apices of R_{4+5} and M_1 and extends to the wing apex. The base of R_3 is sharply bent in *Pleciodes* so the vein extends almost parallel to R_{4+5}. The group somewhat approaches the genus *Penthetria* in this respect, however, R_3 is not so elongated as in that genus. In *Pleciodes* the posterior lobe of the wing, measured to the apex of vein 1st A, is two and one-half times longer than the distance between the apices of veins 1st A and M_{1+2}. In *Plecia* this lobe is usually about equal to, or slightly longer than, the distance between 1st A and M_{1+2}. This is somewhat variable in the latter group and exceptions are present.

Genotype: *Plecia ephippium* Speiser.

Plecia (Pleciodes) ephippium Speiser

Figs. 1a-c

Plecia ephippium Speiser 1910, Sjostedts' Kiliman, Meru Exped., 2(10):38.

Male. Head: Entirely black, all pile black. Antennae ten segmented with the segments rather compact but well defined. Head broad, from a direct dorsal view it is nearly two times wider than long. Rostrum strongly produced and folded beneath the head when not in use. Antennae about equal in length to the head. *Thorax*: Chiefly yellow-red, except for the velvety black stripe that extends from the wing base to the humeri. Thorax almost entirely bare except for a clump of black hairs at the upper portion of each sternopleuron. Halteres brownish black. *Legs*: Entirely black, densely covered with short black hairs. Legs slender, hind femora only slightly enlarged, tibiae scarcely enlarged apically. Hind basitarsi not swollen but almost equal in width to the apices of tibiae. Each metatarsus about three and one-half to four times longer than wide and about equal in length to the next three subsegments of the tarsus. *Wings*: Dark brownish fumose, slightly darker along anterior margin. Stigmata not differentiated. Costa ending slightly beyond the apex of vein R_{4+5} and extending only about one-fifth the distance between R_{4+5} and M_1. Cubital cell closed and petiolate. The petiole is about half as long as the r-m crossvein (fig. 1a). *Abdomen*: Entirely black, with rather dense black pile. *Genitalia*: Ninth sternum broader than long, with the lateral margins strongly curved around the sides of the genital chamber. Hind margin with a pair of small lobes and a small 'U' shaped concavity in the middle.

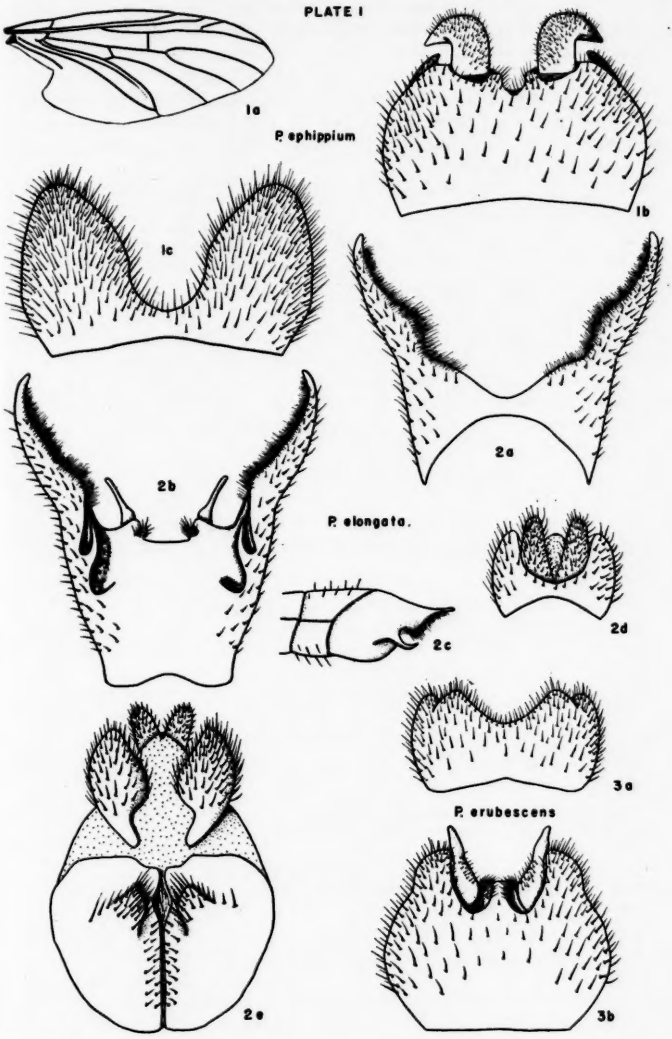

PLATE 1.

Fig. 1. *Plecia (Pleciodes) ephippium* Speiser. a. wing; b. male genitalia, ventral view; c. ninth tergum, male.

Fig. 2. *P. (Plecia) elongata* n. sp. a. ninth tergum, male; b. male genitalia, ventral; c. male genitalia, lateral view; d. female genitalia, dorsal; e. female genitalia, ventral.

Fig. 3. *P. erubescens* Speiser. a. ninth tergum, male; b. male genitalia, ventral (note the claspers fold down out of sight, in normal position).

Claspers large and conspicuous, curved outwardly on their apical halves and acutely pointed (fig. 1b). Ninth tergum one and one-half times wider than long very deeply cleft, almost to its base, on hind margin (fig. 1c).

Length: body 9.5-11.5 mm.; wings, 10.5-13.0 mm.

Female. Antennae eleven segmented. Ocellar tubercle very prominent, the height is three to four times greater than the width of one ocellus. Front about one and one-half times wider than one eye. Otherwise like the male except for the genital characters.

Length: body, 10.5 - 14.0 mm.; wings, 13.0 - 15.0 mm.

Type locality: Meru.

Type in the Naturhistoriska Riksmuseum, Stockholm, Sweden.

The writer has studied the type and a large series of specimens from the following localities: Western slopes of Mt. Kenya on Meru-Nyeri Road, 6-8,500 ft., February 16-23, 1911 (S. A. Neave); 5-7 miles into Kenia Forest near Luchi R., 9-10, 2, 1911; E. foot and slopes Aberdare Mts., 7-8,500 ft., February 24-27, 1911 (S. A. Neave); Uganda, Ruanda, September, 1923 (C. D. H. Carpenter); Top of Aberdare Mts., about 10,000 ft. February 28, 1911 (S. A. Neave); Lamoru Station, Uganda Rly. Brit. E. Africa, March 9-10, 1911 (S. A. Neave); Kikuyu Escarpment between Kijabe and Limoru on Uganda River March 6-10, 1911 (S. A. Neave); Escarpment Station, British E. Africa, 1914 (T. J. A. Anderson); Tanganyika Terr. E. Meru, 7-8,000 ft., January 1938 (B. Cooper); Melsetter, S. Rhodesia, October 1926; Mukule, Belgian Congo; Inyanga, S. Rhodesia, November 1933 (Cuthbertson) and Ugano Tanganyika Territory, Matengo-Hochland, WSW. V. Songea, 15-1700 m., September 20-30, 1935.

Plecia (Plecia) aliena Hardy

Plecia aliena Hardy, 1948, Brit. Mus. Ruwenzori Exped., 1934-'35, 1(6):109-110, figs. 1a-b.

Type locality: Kilembe, Uganda.
Type in British Museum (Natural History).

Plecia (Plecia) basalis Hardy

Plecia basalis Hardy, 1948, Brit. Mus. Ruwenzori Exped., 1934-'35, 1(6):110-111, figs. 2a-b.

Type locality: Kanaba, Uganda.
Type in British Museum (Natural History).

Plecia (Plecia) bidens Hardy

Plecia bidens Hardy, 1948, Brit. Mus. Ruwenzori Exped., 1934-'35, 1(6):111-113, figs. 3a-b.

Type locality: Mobuku Valley, Uganda.
Type in British Museum (Natural History).

Plecia (Plecia) bilobata Hardy

Plecia bilobata Hardy, 1948, Brit. Mus. Ruwenzori Exped., 1934-'35, 1(6):113-114, figs. 4a-b.

Type locality: Fort Portal, Uganda. The species is widespread through eastern and Central Africa and is also known from Sierra Leone.

Type in British Museum (Natural History).

Plecia (Plecia) curta Hardy

Plecia curta Hardy, 1948, Brit. Mus. Ruwenzori Exped., 1934-'35, 1(6):114-115 figs. 5a-b.

Type locality: Fort Portal, Uganda.
Type in British Museum (Natural History).

Plecia (Plecia) elongata n. sp.
Figs. 2a-e

This species is related to *P. uncinata* Hardy. It is readily distinguished by its strongly forcipate genitalia and elongated lateral lobes. The ventral spines extend scarcely to the bases of the lobes, rather than nearly to their apices as in *uncinata*. The claspers are also simple and have no well developed basal lobes.

Male. Pile all black. *Head*: Antennae nine segmented, dark brown to black, sometimes with a faint yellowish tinge. Rostrum well developed but inconspicuous when folded back in resting position. *Thorax*: Humeri, mesonotum and scutellum bright orange, the latter with a faint median stria. The metanotum is chiefly yellowish, with a faint tinge of brown. Pleura dark brown to black. *Legs*: Brown to black all segments slender. *Wings*: Dark brown fumose, stigmata not differentiated. Costa extending nearly half way between the tips of veins R_{4+5} and M_1. Vein R_3 sharply curved near its junction with R_{4+5} and entering the costa at about a fifty degree angle to R_{4+5}. *Abdomen*: Dark brown to black, moderately pilose. *Genitalia*: The ninth tergum and sternum are united at the sides. The segment is strongly forcipate, the posterior lateral margins are extended into long slender arms. From a dorsal view the tergum is cleft nearly to its base on the hind margin (fig. 2a). A strong curved spine is present on each side of the venter, slightly below the middle of the segment (fig. 2c). These spines extend about to the bases of the lateral lobes. The claspers are simple and slender and have but an inconspicuous basal tubercle (fig. 2b). The median portion of the sternum has a pair of small densely bristled lobes just inside of the claspers.

Length: body, 4.5 - 5.0 mm.; wings, 5.0 - 5.5 mm.

Female. Antennae eleven segmented, the scape and pedicel are slightly yellowish tinged. Head with a strong median ridge extending from the ocellar triangle to the antennae. Eyes rather conspicuously short pilose. *Genitalia*: Ninth tergum with a deep 'U' shaped concavity on the hind margin (fig. 2d). The tergum is expanded at its sides and extends around to the ventral portion of the genitalia (fig. 2c). The cerci are large and elongated. The eighth sternum is divided into two large plates. Each plate has a square shaped, densely bristled, lobe near its inner margin (fig. 2e).

Length: body, 5.0 - 6.0 mm.; wings 6.0 - 7.0 mm.

Holotype male and allotype female: Obuasi, Ashanti, W. Africa, caught on flower, in coitu, June 9, 1907 (W. M. Graham). Thirty-two paratypes, fifteen males, seventeen females: same data as type; Njala, Sierra Leone, June, 1925 - September 1929 (E. Hargreaves); Ibadan, Nigeria, November 1925 - May, 1936 (Van Zwaluwenburg, McGough and F. D. Golding); Oshogbo, S. Nigeria, March 1910 (G. G. Simpson); Oshun Bridge, Oshogbo, S. Nigeria, January 6, 1913 (Dr. H. Strachan); Onitsha, S. Nigeria, July 1910 (J. A. de Gaye); Ado-Ekiti, Nigeria, March 6, 1922 (Pomeroy); Yaba, 11-9-09

(W. M. G.); Gold Coast, 1913 (A. R. Gould); Liberia, August 6, 1945 (M. S. Briscoe); Yaounder, Fr. Cam., W. Africa, 1936 (Van Zwaluwenburg and McGough) and Mt. Cameroon, Onyanga 8,100 ft., January 20, 1932 (M. Steele).

Type, allotype, and sixteen paratypes have been returned to the British Museum (Natural History); five have been returned to the Commonwealth Institute of Entomology; five have been returned to the United States National Museum; two have been deposited in the American Museum and four are in the University of Hawaii collection.

Plecia (Plecia) erubescens Speiser

Figs. 3a-b

Plecia erubescens Speiser, 1910, Sjostedts' Kiliman, Meru Exped. 2(10):39.

This species is related to *P. insolita* n. sp. It is distinguished by the striking differences in the genitalia. The following notes are from the original description.

Male. A chiefly black species, only the humeri and scutellum are dusty red. *Head*: Roundish, antennae brownish black. *Thorax*: Opaque brownish black, with three broad black striae faintly seen in the ground color. Scutellum dusty red, with a fine black median line. *Legs*: Femora somewhat thickened on apical third, hind pair more swollen than the others. The basal halves of the femora and tibiae are pitch colored. *Wings*: Smoky brown. Crossvein r-m less than half as long as the petiole of M_{1+2} from the crossvein to its fork. Vein R_3 is at a right angle to R_{4+5}. Halteres black. *Abdomen*: One and one-half times longer than the thorax.

Length: body, 4.7 mm.; wings, 7.0 mm.

Female unknown.

Type locality: Meru.

Type in the Naturhistoriska Riksmuseum, Stockholm, Sweden.

A specimen is at hand which appears to belong to *erubescens*. The hind portion of the mesonotum, however, is dusty red and the legs are entirely black, with no reddish tinged. The body is 5.5 mm., and the wings 6.5 mm., in length. The following description of the male genitalia is taken from this specimen. The ninth tergum is about two times longer than wide. The posterior margin of the tergum has a pair of broad rounded lobes on each side and is gently concave medially. The concavity extends about one-third the length of the sclerite (fig. 3a). The ninth sternum is almost as long as wide and has a large rounded lobe on each posterior lateral margin. The claspers are simple, rather slender and are tapered toward their apices (fig. 3b).

The specimen studied was from Elisabethville, Belgian Congo, October 11-17, 1931 (Mrs. L. Ogilvie).

(To be concluded in the next issue)

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